APRIL/MAY 2023

DMA42 — FLUID DYNAMICS

Time : Three hours

Maximum : 75 marks

Shanmuga Industries Arts & Science College T.V.Malai

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. What is viscous fluid?

2. Define circulation.

3. What is simple source?

4. Define atmosphere pressure.

5. Define the vector moment of a doublet.

6. Define dipole.

7. Discuss the flow for which $\omega = z^2$.

8. Define one dimensional flow.

9. Define sheering stress.

10. Give the coefficient of viscosity.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Define the vortex tube and explain its strength.

Or

(b) Discuss real fluid and ideal fluid.

12. (a) Find fluid velocity using pitot tube.

Or

(b) Explain pressure at a point in a fluid at rest.

13. (a) Find stream function at a point in a uniform stream.

Or

(b) Find velocity potential at a point in a doublet.

14. (a) Discuss the flow due to uniform line doublet at origin of strength μ per unit length, its axis being along $\overline{OX}$.

Or

(b) Solve Laplace's equation in cylindrical polar co – ordinates.

15. (a) Discuss the equation of rate of strain quadric referred to its principal axes.

Or

(b) Explain translation motion of fluid element.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Drive the equation of continuity of motion.

17. Prove that the pressure at any point of a moving inviscid fluid is the same in all directions.

18. Prove that the streamlines lie in planes passing through the axis of the doublet.

19. Find the equations of the streamlines due to uniform line sources of strength m through the points $A(-c, 0)$, $B(c, 0)$ and a uniform line sink of strength 2m through the origin.

20. Discuss the relation between Cartesian components of stress.